

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant : Liang, Dah-Ben, et al. Confirmation No. 7809  
Application No. : 09/637,764  
Filed : August 10, 2000  
Title : ROCK BIT WITH HARD-FACING MATERIAL INCORPORATING  
SPHERICAL CAST CARBIDE PARTICLES  
  
Grp./Div. : 3672  
Examiner : William P. Neuder  
  
Docket No. : 36912/S61

**DECLARATION OF INEZ CAMERON IN SUPPORT OF  
PETITION UNDER 37 C.F.R. §1.47(a) TO ACCEPT UNEXECUTED DECLARATION  
ON BEHALF OF AN UNCOOPERATIVE JOINT INVENTOR**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Post Office Box 7068  
Pasadena, CA 91109-7068  
March 2, 2011

Commissioner:

I, Inez Cameron, hereby declare that:

1. I am a Patent Administrator for the assignee of the above-referenced reissue patent application, Smith International, Inc. I have personal knowledge of the facts stated herein, unless otherwise noted.

2. On December 2, 2010, I received a communication from our Patent Attorney, Constantine "Gus" Marantidis, providing a copy of a response to the Office action mailed on September 3, 2010 (the "Response") that issued on the above-referenced reissue application, as well as copies of the Substitute Declarations for Reissue Patent Application (the "Substitute Declaration") to be signed by the joint inventors.

3. Soon thereafter, I forwarded a copy of the Substitute Declaration, along with the Response to joint inventor, Zhigang Fang (also known as Zak Fang). True and accurate copies of the Substitute Declaration and the Response forwarded to Mr. Fang are attached hereto in Appendices A and B, respectively.

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4. I followed up with Mr. Fang by telephone. On or about February 23, 2011, Mr. Fang stated over the telephone that he will sign the Substitute Declaration.

5. On February 24, 2011, I received an email from Mr. Fang stating that he will not be signing the Substitute Declaration because he did not have time to review the Response. I replied by email to Mr. Fang asking him to review the Response and to sign the Substitute Declaration. A true and accurate copy of the email communication of February 24, 2011 to Mr. Fang is attached hereto in Appendix C.

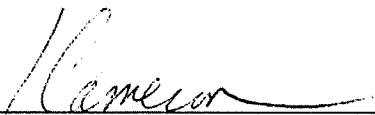
6. On March 1, 2011, I sent Mr. Fang another email inquiring if the documents (i.e., the Substitute Declaration) were sent back to me. A true and accurate copy of my email communication of March 1, 2011 to Mr. Fang is attached hereto in Appendix D.

7. On March 2, 2011, I left a voicemail to Mr. Fang and he replied by email advising that he will not have time to review the documents (i.e., the Response and Substitute Declaration). A true and accurate copy of the email communication of March 2, 2011 from Mr. Fang is attached hereto in Appendix E.

8. To this date, I have not received a copy of the signed Substitute Declaration from Mr. Fang.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date 3/3/11

By   
Inez Cameron

CM/mml  
MML PAS946037.1-\* -03/2/11 4:27 PM

# APPENDIX A

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Confirmation No. 7809

Reissue of	:	U.S. Patent No. 5,791,422
Patent Issue Date	:	August 11, 1998
Patentee	:	Dah Ben Liang, et al.
Application No.	:	09/637,764
Filed	:	August 10, 2000
Title	:	ROCK BIT WITH HARDFACING MATERIAL INCORPORATING SPHERICAL CAST CARBIDE PARTICLES
Grp./Div.	:	3672
Examiner	:	NEUDER, Willam P.
Docket No.	:	36912/S61
Customer No.	:	23363

**SUBSTITUTE DECLARATION FOR REISSUE PATENT APPLICATION**

**Mail Stop REISSUE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Post Office Box 7068  
Pasadena, CA 91109-7068

Commissioner:

As a below named inventor, I hereby declare that my residence and post office address is listed below, I am a citizen of the United States of America, and I believe I am an original, first and joint inventor of the subject matter described and claimed in U.S. Patent No. 5,791,422 ("the '422 Patent"), issued on August 11, 1998, for which a reissue patent is sought on the invention entitled ROCK BIT WITH HARDFACING MATERIAL INCORPORATING SPHERICAL CAST CARBIDE PARTICLES. The application for the '422 Patent was filed on March 12, 1997, as Application Serial No. 08/815,745 ("the '745 Application").

I acknowledge the duty to disclose information known to me to be material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I believe that the '422 Patent is partially inoperative because none of the claims in the '422 Patent are directed to a rock bit comprising a cutting cone having a number of teeth which include a hardfacing comprising spherical cast tungsten carbide particles having particle sizes

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between about 16 mesh to less than 40 mesh without also requiring particle sizes between about 80 and 200 mesh. The novelty of this aspect of my invention was erroneously overlooked, as I did not appreciate the full scope of the invention being claimed at the time the '745 Application was filed and during its prosecution. My failure to recognize the full scope of the invention being claimed was inadvertent as is evidenced by the fact that although this novel feature was described in the specification of the '745 Application, it was not broadly claimed. As a result of this failure, I claimed less than I had a right to claim in the '422 Patent. Every error in the patent which was corrected in the present reissue application, and is not covered by a prior oath/declaration submitted in this application, arose without an deceptive intention on the part of the applicant.

I hereby state that I have reviewed and understand the content of the above-identified application, including the original claims 1-3, 7-27 and any amendment made to such claims, and the added reissue claims 28, 31-33, 35-37, 39-41 and 43-67, and any amendment made to such added claims.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the reissue application or any patent issuing thereon.

Date \_\_\_\_\_

By \_\_\_\_\_

Zhigang Fang  
6718 South Aqua Vista Place  
Salt Lake City, Utah 84121

CM/mml

MML PAS931939.1-\*-12/1/10 4:16 PM

# APPENDIX B

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

*I hereby certify that this correspondence is being electronically filed with the United States Patent and Trademark Office on December 2, 2010 at or before 11:59 p.m. Pacific Time under the Rules of 37 CFR § 1.8.*

\_\_\_\_\_  
Marian M. Liu

Confirmation No. 7809

Reissue of	:	U.S. Patent No. 5,791,422
Patent Issue Date	:	August 11, 1998
Patentee	:	Dah Ben Liang, et al.
Application No.	:	09/637,764
Filed	:	August 10, 2000
Title	:	ROCK BIT WITH HARDFACING MATERIAL INCORPORATING SPHERICAL CAST CARBIDE PARTICLES
Grp./Div.	:	3672
Examiner	:	NEUDER, William P.
Docket No.	:	36912/S61
Customer No.	:	23363

**AMENDMENT FOR REISSUE APPLICATION;  
STATUS OF CLAIMS AND SUPPORT FOR CLAIM CHANGES**

**Mail Stop REISSUE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Post Office Box 7068  
Pasadena, CA 91109-7068  
December 2, 2010

Commissioner:

In response to the Office action mailed on September 3, 2010, please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this response;

**Remarks/Arguments** begin on page 16 of this response; and

**Support for Claim Changes** begin on pages 19 of this response.

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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Please amend claims 1-4, 9, 12-15, 17, 18, 20, 23, 24, 28, 31-33, 35-37, 39-41, 43-46, 53-55, 58 and 59, cancel claim 29, and add claims 62-67 as follows:

1. (Thrice Amended) A rock bit comprising:  
a body;  
at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone;  
a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising:  
steel in the range of from 20 to 50 percent by weight of the hardfacing; and  
filler in the range of from 50 to 80 percent by weight of the hardfacing,  
the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 16 to 40 mesh and between about 80 and 200 mesh, and tungsten carbide particles selected from the group consisting of spherical cemented, crushed cemented, crushed cast, crushed macrocrystalline, and carburized.
2. (Amended) The rock bit of claim 1 comprising filler in the range of from 60 to 75 percent by weight of the hardfacing.
3. (Amended) The rock bit of claim 1 wherein the filler comprises in the range of from 20 to 50 percent by weight of the filler spherical cast tungsten carbide particles.



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4. (Amended) The rock bit of claim 1 wherein the filler comprises in the range of from 40 to 100 percent by weight of the filler spherical cast tungsten carbide particles.
- 5-6. (Canceled)
7. (Twice Amended) The rock bit of claim [[6]] 1 wherein the filler comprises spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 100 to 200 mesh.
8. (Twice Amended) The rock bit of claim [[5]] 1 wherein the filler further comprises macrocrystalline tungsten carbide particles having [[a]] particle [[size]] sizes between about 40 to 80 mesh.
9. (Twice Amended) A rock bit as recited in claim 1 wherein the hardfacing comprises in the range of from 10 to 90 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 16 to 40 mesh, and further comprises ultra-fine tungsten carbide particles in the range of from 10 to 35 percent by weight of the filler [material], the particles having particle sizes in the range of from about 1 to 50 microns.
10. (Original) A rock bit as recited in claim 9 wherein the ultra-fine tungsten carbide particles are selected from the group consisting of carburized, macrocrystalline, and spherical cast.
11. (Original) A rock bit as recited in claim 9 wherein the steel in the hardfacing is dispersion strengthened by the ultra-fine tungsten carbide particles.
12. (Twice Amended) A rock bit comprising:  
a body;

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at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone;

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising:

steel in the range of from 20 to 50 percent by weight of the hardfacing;

filler in the range of from 50 to 80 percent by weight of the hardfacing,

the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 80 to 200 mesh.

13. (Amended) The rock bit of claim 12 comprising filler in the range of from 60 to 75 percent by weight of the hardfacing.

14. (Amended) The rock bit of claim 12 wherein the filler comprises in the range of from 20 to 50 percent by weight of the filler spherical cast tungsten carbide particles.

15. (Amended) The rock bit of claim 12 wherein the filler comprises in the range of from 40 to 100 percent by weight of the filler spherical cast tungsten carbide particles.

16. (Amended) The rock bit of claim 12 wherein the filler comprises spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 100 to 200 mesh.

17. (Amended) The rock bit of claim 12 wherein the filler comprises in the range of from 10 to 99 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 80 to 200 mesh, and further comprises spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 16 to 40 mesh.

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18. (Twice Amended) The rock bit of claim 12 wherein the filler comprises in the range of from 10 to 99 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 80 to 200 mesh, and further comprises tungsten carbide particles selected from the group including spherical cemented, crushed cemented, crushed cast and crushed macrocrystalline.

19. (Amended) The rock bit of claim 18 wherein the filler further comprises macrocrystalline tungsten carbide particles having [[a]] particle [[size]] sizes between about 40 to 80 mesh.

20. (Twice Amended) A rock bit as recited in claim 12 wherein the hard-facing comprises in the range of from 10 to 90 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 80 to 200 mesh, and further comprises ultra-fine tungsten carbide particles in the range of from 10 to 35 percent by weight of the filler [material], the particles having a particle size in the range of from about 1 to 50 microns.

21. (Original) A rock bit as recited in claim 20 wherein the ultra-fine tungsten carbide particles are selected from the group consisting of carburized, macrocrystalline, and spherical cast.

22. (Original) A rock bit as recited in claim 20 wherein the steel in the hardfacing is dispersion strengthened by the ultra-fine tungsten carbide particles.

23. (Twice Amended) A rock bit comprising:  
a body;  
at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone;

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a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising:

steel in the range of from 20 to 50 percent by weight of the hardfacing;

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 16 to 40 mesh and between about 80 to 200 mesh.

24. (Twice Amended) A rock bit as recited in claim 23 wherein the hard-facing comprises in the range of from 10 to 90 percent by weight of the filler spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 16 and 40 mesh and between about 80 to 200 mesh, and further comprises ultra-fine tungsten carbide particles in the range of from 10 to 40 percent by weight of the filler [material], the particles having [[a]] particle [[size]] sizes in the range of from about 1 to 50 microns.

25. (Original) A rock bit as recited in claim 24 wherein the ultra-fine tungsten carbide particles are selected from the group consisting of carburized, macrocrystalline, and spherical cast.

26. (Original) A rock bit as recited in claim 24 wherein the steel in the hardfacing is dispersion strengthened by the ultra-fine tungsten carbide particles.

27. (Amended) The rock bit of claim 23 wherein the filler comprises spherical cast tungsten carbide particles having [[a]] particle [[size]] sizes between about 100 to 200 mesh.

28. (New) A rock bit comprising:  
a body;

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at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising in the range of from 19 to 100 percent by weight of the filler spherical cast tungsten carbide particles having particle sizes between about 16 mesh to less than 40 mesh.

29. (Canceled)

30. (Canceled)

31. (New) A rock bit as recited in claim 28, the filler further comprising spherical tungsten carbide particles having particle sizes between greater than 80 to 200 mesh.

32. (New) A rock bit comprising:

a body;

at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having particle sizes between greater than 80 mesh and 200 mesh.

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33. (New) A rock bit as recited in claim 32 wherein the filler comprises in the range of from 19 to 100 percent by weight of the filler spherical cast tungsten carbide particles.

34. (Canceled)

35. (New) A rock bit as recited in claim 32, the filler further comprising spherical tungsten carbide particles having particle sizes between 16 to less than 40 mesh.

36. (New) A rock bit comprising:  
a body;  
at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and  
a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,  
steel, and  
filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having particle sizes between about 16 to 40 mesh and between about 80 to 200 mesh.

37. (New) A rock bit as recited in claim 36 comprising steel in the range of 20 to 50 percent by weight of the hardfacing, and wherein the spherical tungsten carbide particles have particle sizes between about 16 to less than 40 mesh and between greater than 80 to 200 mesh.

38. (Canceled)

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39. (New) A rock bit comprising:  
    a body;  
    at least one cutting cone rotatably mounted to an end of the body, wherein the  
    cone includes a gage surface at a heel portion of the cone; and  
    a number of teeth on the cone, the teeth including a plurality of inner row teeth  
    and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a  
    hardfacing comprising,  
    steel, and  
    filler in the range of from 50 to 80 percent by weight of the hardfacing, the  
    filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide  
    particles and a second percent by weight of the filler of spherical cast carbide particles, wherein  
    the first percent is greater than the second percent, wherein the second percent is at least 19  
    percent.
40. (New) A rock bit as recited in claim 39 wherein the filler comprises in the range  
    of from 19 to 100 percent by weight of the filler spherical cast tungsten carbide.
41. (New) A rock bit as recited in claim 36 wherein the filler comprises in the range  
    of from 19 to 100 percent by weight of the filler spherical cast tungsten carbide.
42. (Canceled)
43. (New) A rock bit as recited in claim 39 wherein the first percent is 70.
44. (New) A rock bit as recited in claim 43 wherein the second percent is 20.
45. (New) A rock bit as recited in claim 44, the filler further comprising 10 percent  
    by weight of the filler carbide particles having a particle size of 30μm.

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46. (New) A rock bit as recited in claim 39 wherein the second percent is 20.

47. (New) A rock bit as recited in claim 43 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh.

48. (New) A rock bit as recited in claim 47 wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

49. (New) A rock bit as recited in claim 43 wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

50. (New) A rock bit as recited in claim 39 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh.

51. (New) A rock bit as recited in claim 50 wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

52. (New) A rock bit as recited in claim 39 wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

53. (New) A rock bit comprising:

a body;

at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,



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steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide particles and a second percent by weight of the filler spherical cast carbide particles, wherein the second percent is greater than the first percent.

54. (New) A rock bit as recited in claim 53 wherein the first percent is 35 and the second percent is 45.

55. (New) A rock bit as recited in claim 54, the filler further comprising 20 percent by weight of the filler carbide particles having a particle size of 30 $\mu$ m.

56. (New) A rock bit as recited in claim 54 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 48 to 200 mesh and the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

57. (New) A rock bit as recited in claim 53 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 48 to 200 mesh and the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

58. (New) A rock bit as recited in claim 53 wherein the first percent is 40 and the second percent is 50.

59. (New) A rock bit as recited in claim 58, the filler further comprising 10 percent by weight of the filler carbide particles having a particle size of 30 $\mu$ m.

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60. (New) A rock bit as recited in claim 58 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh and the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

61. (New) A rock bit as recited in claim 53 wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh and the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

62. (New) A rock bit comprising:  
a body;  
at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and  
a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,  
steel, and  
filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising in the range of from 10 to 100 percent by weight of the filler spherical cast tungsten carbide particles having particle sizes between about 16 mesh to less than 40 mesh and spherical tungsten carbide particles having particle sizes between greater than 80 to 200 mesh.

63. (New) A rock bit comprising:  
a body;  
at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and  
a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

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steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising 70 percent by weight of the filler of spherical cemented tungsten carbide particles and 20 percent by weight of the filler of spherical cast carbide particles, and 10 percent by weight of the filler carbide particles having a particle size of 30 $\mu$ m.

64. (New) A rock bit comprising:

a body;

at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide particles and a second percent by weight of the filler of spherical cast carbide particles, wherein the first percent is greater than the second percent, wherein the first weight percent is 70, wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh, and wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

65. (New) A rock bit comprising:

a body;

at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

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a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide particles and a second percent by weight of the filler of spherical cast carbide particles, wherein the first percent is greater than the second percent, wherein the first weight percent is 70, and wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

66. (New) A rock bit comprising:

a body;

at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide particles and a second percent by weight of the filler of spherical cast carbide particles, wherein the first percent is greater than the second percent, wherein the spherical cemented tungsten carbide particles have particle sizes in the range of 28 to 35 mesh, and wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

67. (New) A rock bit comprising:

a body;

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at least one cutting cone rotatably mounted to an end of the body, wherein the cone includes a gage surface at a heel portion of the cone; and

a number of teeth on the cone, the teeth including a plurality of inner row teeth and a plurality of gage row teeth located near a heel of each cone, wherein the teeth include a hardfacing comprising,

steel, and

filler in the range of from 50 to 80 percent by weight of the hardfacing, the filler comprising a first percent by weight of the filler of spherical cemented tungsten carbide particles and a second percent by weight of the filler of spherical cast carbide particles, wherein the first percent is greater than the second percent, wherein the spherical cast carbide particles have a particle size in the range of 100 to 200 mesh.

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**REMARKS/ARGUMENTS**

The above amendments and these remarks are in response to the Office action mailed on September 3, 2010. Claims 1-4, 9, 12-15, 17, 18, 20, 23, 24, 28, 31-33, 35-37, 39-41, 43-46, 53-55, 58 and 59 have been amended for clarity. Claim 29 has been canceled. Claims 62-67 have been added and are directed to subject matter disclosed in the application as originally filed. No new matter has been added. Claims 1-4, 7-28, 31-33, 35-37, 39-41 and 43-67 are now pending in this application. Reconsideration on the basis of the above amendments and remarks below is kindly requested.

Four Substitute Declarations for Reissue Patent Application from the inventors are being submitted herewith.

The undersigned attorney wishes to thank the Examiner for the telephonic interview on November 23, 2010, where the claims and the teachings of Overstreet et al., U.S. Patent No. 5,492,186, were discussed.

The Examiner rejected claims 40, 44, 58 and 60 under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner states that claim 44 was a duplicate of claim 29. I believe the Examiner meant to state that claim 40 was a duplicate of claim 29. Claim 40 has been amended to be dependent from claim 39. Similarly, claim 41 has been amended to be dependent from claim 36.

The remaining claims have been amended to clarify whether the weight percent is based on the weight of the hardfacing or the weight of the filler. I believe the Examiner has interpreted that all the weight percents were based on the weight percent of the hardfacing. The claims as now amended should address all the other 35 U.S.C. §112 second paragraph rejections.

The Examiner rejected claims 28, 29, 39, 40, 43, 44, 46, 47 and 50 under 35 U.S.C. §103(a) as being unpatentable over Overstreet et al. Claim 28 requires that the hardfacing

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comprises filler in the range of from 50 to 80 percent by weight of the hardfacing, and that the filler comprises in the range of from 19 to 100 percent by weight of the filler spherical cast tungsten carbide particles. Overstreet et al., on column 4, lines 19-26, states,

"The first hardfacing composition 55, contained a mixture of cemented tungsten carbide spheres of 16-30 mesh and particles of crushed cemented tungsten carbide of 20-30 mesh and crushed cast tungsten carbide of 60-80 mesh. The percent by weight of the above three tungsten carbide particles in the rod is respectively 66, 15 and 15%. The rod contained deoxidizer of silicomanganese of about four percent and niobium of less than one percent."

In other words, Overstreet et al. discloses 66% of cemented tungsten carbide spheres of 16 to 30 mesh, 15% particles of crushed cemented tungsten carbide of 20 to 30 mesh, and 15% crushed cast tungsten carbide of 60-80 mesh. Thus, Overstreet et al. discloses only 15%, by weight of the filler, cast tungsten carbide. Overstreet et al. does not disclose, teach or suggest that the filler comprises in a range of from 19% to 100%, by weight of the filler, spherical cast tungsten carbide. Thus, applicant submits that claim 28 is not rendered obvious by Overstreet et al.

Claim 39 requires that the filler has a second percent of spherical cast carbide particles where the second percent is at least 19%. As discussed, this amount of cast tungsten carbide is not disclosed, taught nor suggested by Overstreet et al. Thus, applicant submits that claim 39 is also not rendered obvious by Overstreet et al. Claims 40, 43, 44, 46, 47 and 50 are directly or indirectly dependent from claim 39. As such, applicant submits that these claims 40, 43, 44, 46, 47 and 50 are also not rendered obvious by Overstreet et al. for the same reasons that Overstreet et al. does not render claim 39 obvious, and for the additional limitations that claims 40, 43, 44, 46, 47 and 50 contain therein. For example, claim 43 requires that the first percent, which is the percent by weight of the filler of spherical cemented carbide particles, is 70. Overstreet et al. discloses 66% of cemented tungsten carbide spheres. Claims 44 and 46 require that the second percent is 20. The second percent is the percent by weight of filler of spherical cast tungsten carbide particles. Overstreet et al. discloses use of only 15% by weight of cast tungsten carbide.

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Thus, applicant submits that claims 44, 44 and 46 are not rendered obvious by Overstreet et al. for these additional reasons.

The Examiner stated that it would have been considered obvious to provide a hardfacing where the hardfacing includes only one of the spherical cast carbides and the crushed carbide in view of the Overstreet et al. teaching that a hardfacing can include only a spherical tungsten carbide or spherical cast carbide and crushed cast carbide. Applicant respectfully disagrees. The present invention provides for an a hardfacing which has improved wear resistance. The limitations in the claims provide for an increase in wear resistance. The hardfacing composition upon which the Examiner has relied upon in Overstreet et al. has a lower level of abrasion resistance and a higher level of fracture resistance (see column 3, line 67 to column 4, line 7). In other words, Overstreet et al. teaches away from the present invention in that the claimed invention provides for an increase in wear resistance, where Overstreet et al. in the cited section appears to teach a decrease in wear or abrasion resistance. As such, applicant submits that one skilled in the art wanting to improve the wear resistance of a hardfacing would not have followed the teachings of Overstreet et al.

The Examiner objected to claims 31, 45, 48, 49, 51 and 52, but stated that these claims would be allowable if rewritten in independent form, including all of the limitations of their base claims and any intervening claims. Claims 28, 45, 48, 49, 51 and 52 have been rewritten in independent, including all of the limitations of their base claims and any intervening claims, as claims 62-67. respectively. Thus, applicant submits that claims 62-67 are also now in condition for allowance.

The amendments to all the claims in this application have been made for clarity. In addition, the amendments to claims 28 and 39 find support on column 6, line 66 to column 7, line 13, and the Table on column 7 in the specification of U.S. Patent No. 5,791,422. Support for the amendments to claims 40 and 41 is found on column 6, line 66 to column 7, line 13, and on



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the Table on column 7, in the specification of U.S. Patent No. 5,791,422. The other claims 62-67 find support in previously pending claims 28, 45, 48, 29, 51 and 52, respectively.

The objections and rejections to the claims pending in this application are believed to have been overcome and this application is now believed to be in condition for allowance. Should the Examiner have any remaining questions or concerns about the allowability of this application, the Examiner is kindly requested to call the undersigned attorney to discuss them.

Respectfully submitted,  
CHRISTIE, PARKER & HALE, LLP

By \_\_\_\_\_  
Constantine Marantidis  
Reg. No. 39,759  
626/795-9900

CM/mml

MML PAS931807.1-\* -12/2/10 1:21 PM

# APPENDIX C

## Constantine Marantidis

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**From:** Cameron, Inez [icameron@slb.com]  
**Sent:** Thursday, February 24, 2011 2:53 PM  
**To:** Zak Fang  
**Cc:** Constantine Marantidis  
**Subject:** RE: signature

Hi Zak, If you would review the papers & sign I'd appreciate it, we need to file them on Monday or Tuesday at the latest. Thanks Zak

-----Original Message-----

**From:** Zak Fang [mailto:zak.fang@utah.edu]  
**Sent:** Thursday, February 24, 2011 4:43 PM  
**To:** Cameron, Inez  
**Subject:** signature

Inez,

I promised you that I will sign the thing and fax to you. But, I didn't do it. I am sorry. I don't mean to make your work hard. But, when I saw the text such as "...I hereby state that I have reviewed and understand the content of the...." I had to pause because I did not review the content. Reviewing the content is going to take time.

I want to apologize to you for not keeping my promise. But, I don't want to sign any legal documents that I have not reviewed. I hope you can understand.

Best regards,

Zak Fang

# APPENDIX D

## Constantine Marantidis

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**From:** Cameron, Inez [icameron@slb.com]  
**Sent:** Tuesday, March 01, 2011 12:18 PM  
**To:** Zak Fang  
**Cc:** Constantine Marantidis; Marian M. Liu  
**Subject:** RE: signature

Hi Zak, have you sent these documents yet?

-----Original Message-----

**From:** Zak Fang [mailto:zak.fang@utah.edu]  
**Sent:** Thursday, February 24, 2011 4:43 PM  
**To:** Cameron, Inez  
**Subject:** signature

Inez,

I promised you that I will sign the thing and fax to you. But, I didn't do it. I am sorry. I don't mean to make your work hard. But, when I saw the text such as "...I hereby state that I have reviewed and understand the content of the...." I had to pause because I did not review the content. Reviewing the content is going to take time.

I want to apologize to you for not keeping my promise. But, I don't want to sign any legal documents that I have not reviewed. I hope you can understand.

Best regards,

Zak Fang

# APPENDIX E

## Constantine Marantidis

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**From:** Cameron, Inez [icameron@slb.com]  
**Sent:** Wednesday, March 02, 2011 11:54 AM  
**To:** Constantine Marantidis  
**Cc:** Holthus, Lisa  
**Subject:** FW: signature

See below

-----Original Message-----

**From:** Zhigang Zak Fang [mailto:zak.fang@utah.edu]  
**Sent:** Wednesday, March 02, 2011 1:51 PM  
**To:** Cameron, Inez  
**Subject:** RE: signature

Hi Inez.

I am traveling until tomorrow, and I will be gone again for two weeks. I am afraid that I won't have time to review the document any time soon.

Sorry I cannot be

---

**From:** Cameron, Inez [icameron@slb.com]  
**Sent:** Wednesday, March 02, 2011 11:17 AM  
**To:** Zhigang Zak Fang  
**Cc:** Constantine Marantidis; Holthus, Lisa  
**Subject:** RE: signature

Hi Zak, I just left a message on your voicemail (801-581-8128) regarding the declaration. Just wondered if you had mailed it to me yet? Thanks, Inez

-----Original Message-----

**From:** Cameron, Inez  
**Sent:** Thursday, February 24, 2011 4:53 PM  
**To:** 'Zak Fang'  
**Cc:** Constantine Marantidis  
**Subject:** RE: signature

Hi Zak, If you would review the papers & sign I'd appreciate it, we need to file them on Monday or Tuesday at the latest. Thanks Zak

-----Original Message-----

**From:** Zak Fang [mailto:zak.fang@utah.edu]  
**Sent:** Thursday, February 24, 2011 4:43 PM  
**To:** Cameron, Inez  
**Subject:** signature

Inez,

I promised you that I will sign the thing and fax to you. But, I didn't do it. I am sorry. I don't mean to make your work hard. But, when I saw the text such as "...I hereby state that I have reviewed and understand the content of the...." I had to pause because I did not review the content. Reviewing the content is going to take time.

I want to apologize to you for not keeping my promise. But, I don't want to sign any legal documents that I have not reviewed. I hope you can understand.

Best regards,

Zak Fang